Atty. Dckt. No. MIT-066FUS

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO : 6,900,997 B2

DATED : May 31, 2005

INVENTOR(S) : David J. Perreault et al.

It is certified that errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 2, line 9 delete "1991 thyristor devices" and replace with --1991, thyristor devices--.

Column 4, line 32 delete "having an output a control circuit" and replace with --having an output, a control circuit--.

Column 7, line 14 delete "circuits even" and replace with --circuits, even--.

Column 8, line 47 delete "switched mode" and replace with --switched-mode--.

Column 10, line 34 delete "it should" and replace with --It should--.

Column 10, line 50 delete "16 a" and replace with --16a--.

Column 10, line 64 delete "alternator 12 the" and replace with --alternator 12, the--.

Column 12, lines 9-10 delete "Alternator" and replace with --"Alternators,"--.

Column 13, line 7 delete "emf one can" and replace with --emf, one can--.

Column 14, line 34 delete "(not shown) an engine" and replace with --(not shown), an engine--.

Column 14, lines 47-48 delete "switched mode" and replace with --switched-mode--.

Column 14, line 51 delete "Vg" and replace with --V_g--.

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Column 14, line 52 delete “value the” and replace with --value, the--.

Column 14, line 54 delete “Vg” and replace with --V_g--.

Column 14, line 54 delete “value the” and replace with --value, the--.

Column 14, line 65 delete “value.” and replace with --value).--.

Column 14, line 66 delete “Sw” and replace with --S_w--.

Column 15, line 13 delete “Vo.” and replace with --V_o--.

Column 15, line 62-63 delete “switched mode” and replace with --switched-mode--.

Column 16, line 62 delete “$\langle i_o \rangle = 3(1\text{-d})(\text{sqrt}[V^2_s - (4/\pi^2)(1\text{-d})^2 v^2_o])/\ \pi\omega l_s$” and replace with --$\langle i_o \rangle = 3(1\text{-d})(\text{sqrt}[V^2_s - (4/\pi^2)(1\text{-d})^2 v^2_o])/\ \pi\omega L_s$--.

Column 16, line 66 delete “i_{71}” and replace with --i_f--.

Column 17, line 41 delete “$i_{71,\ \max}$” and replace with --$i_{f,\ \max}$--.

Column 20, line 39 delete “Vd” and replace with --V_d--.

Column 20, line 40 delete “switched mode” and replace with --switched-mode--.

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Column 23, line 55 delete "range the" and replace with --range, the--.

Column 25, line 41 delete "dual output" and replace with --dual-output--.

Column 26, line 37 delete "Qx, Qy, Qz" and replace with --Q_x, Q_y, Q_z--.

Column 27, line 31 after "terminals of" insert the following text --switching elements 58a', 58b' and terminal d of the diode bridge is coupled to a transformer 120. In this particular embodiment, the switching elements 58a', 58b', are provided as MOSFETs each having first terminals (here corresponding to source terminals) coupled to terminal e of the diode bridge 73.

The transformer 120 includes a primary transformer winding 122 having N1 turns. Terminal e of the diode bridge is coupled to the center tap of the primary transformer winding 122 while second terminals (here drain terminals) of the switches 58a' and 58b' are coupled to opposite ends of the primary transformer winding 122. The transformer 120 also includes secondary windings 124, 126 having turns N2, N3 respectively. The secondary winding 124 is connected with diodes 128 and 129 to output voltage V_{01} and secondary winding 126 is connected with diodes 130 and 131 to the output voltage V_{02}. The turns ratios N1/N2 and N1/N3 are chosen to have the desired voltage levels V_{01} and V_{02}.

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The switches 58a', 58b' also have third or control terminals (here gate terminals) which receive control signals from a control system 74'.

In this particular embodiment, the control system 74' includes a control processor 80 which receives input signals corresponding to speed and the output voltage V_{01}. It should be appreciated that although the voltage V_{01} is used in this particular example, the voltage V_{02} could alternatively be used. Thus, the control processor 80 can receive input signals corresponding to speed and one of the output voltages V_{01} or V_{02}.

The control processor 80' provides control signals to duty controller 84' and field controller 86'. It should be appreciated that although the control system 74' is here shown provided from a plurality of different controllers and processors, it should be appreciated that the control system 74' could also be implemented as a single controller or processor 74' which provides all the functions performed by processor 80 and controllers 84' and 86'.--.

Column 28, line 67 delete "circuit a" and replace with --circuit, a--.

Column 28, betweens lines 16 and 17, the following text should be inserted:

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It is certified that errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

--The negative terminal of the low-voltage source is connected to system ground as is the negative terminal of the high-voltage battery 102. In this configuration the alternator machine inductances in conjunction with the switched-mode rectifier can be used as a boost dc/dc converter to charge the high-voltage battery 102 from the charging source.

When the MOSFETs 58a-58c are turned on, the current in the machine inductances increases, drawing energy from the low-voltage source and storing it in the machine inductances. When the MOSFETs 58a-58c are turned off, some of this energy plus additional energy from the low-voltage source is transferred to the high-voltage battery 102 through the diodes 56a-56c. The high-voltage battery 102 may be charged from a low-voltage source (for jump-starting purposes, for example) using this method.

It should be recognized that this approach may also be utilized in dual-voltage systems such as the system described below in conjunction with Fig. 15. In the case of a dual-voltage system, the low-voltage source may be the low-voltage battery of the same vehicle, or it may be supplied from a different vehicle or source. Again, a means is provided for selectively connecting the alternator machine neutral to the desired low-voltage source. In a dual-voltage

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system charging from its own low-voltage battery, this connection may be conveniently provided by a relay connecting the machine neutral to the positive terminal of the low-voltage battery, for example.

A jump charging controller 105 couples a portion of the output voltage Vo (or in some embodiments it may be desirable or preferable to couple a portion of the output current or both the output voltage and the output current) and provides a control signal to the control circuit 36. The circuit 105 regulates the output voltage Vo by changing the duty ratio of the switched mode rectifier circuit 54 to obtain a desired output voltage or current to charge the battery. It should be noted that often in the case where it is necessary to utilize this mode of operation, the associated engine and alternator will not be running and thus the speed sensor 20 would provide a control signal corresponding to zero alternator rpms.--

Column 30, line 32 delete "switched mode" and replace with --switched-mode--.

Column 30, line 34 delete "switched mode" and replace with --switched-mode--.

Column 30, lines 42-43 delete the first occurrence of "control" and the second occurrence of "circuit".

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Column 31, line 5 delete “wherein and the negative” and replace with --wherein the negative--.

Column 32, line 11 delete “in a different vehicles.” and replace with --in different vehicles.--.

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